

E 1-28: SOLAR - 1/2018 - 79 /05 ✓

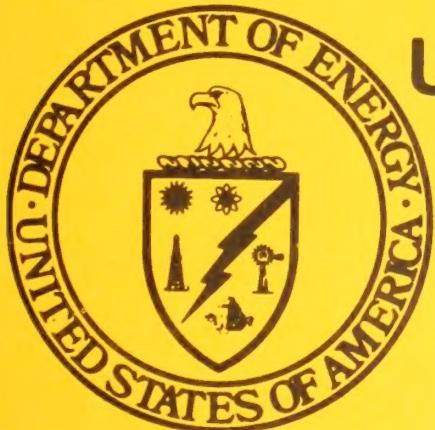
SOLAR/2018-79/05

Aleph 1214382

Monthly Performance Report

REEDY CREEK UTILITIES

MAY 1979



U.S. Department of Energy

National Solar Heating and
Cooling Demonstration Program

National Solar Data Program

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Department of Energy, nor any of their employees, nor any of their contractors, subcontractors, or their employees, make any warranty, express or implied, or assume any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

MONTHLY PERFORMANCE REPORT
REEDY CREEK UTILITIES
MAY 1979

I. SYSTEM DESCRIPTION

The Reedy Creek site is a two story, 6,100 square foot concrete block office building located in Lake Buena Vista, Florida. The solar energy system is designed to provide space heating, domestic hot water and space cooling.

The collector subsystem is composed of a horizontal array of 16 parabolic trough collectors, manufactured by AAI Corporation, with tracking absorber tubes. The collector array is an integral part of the building's roof, with the reflector troughs oriented so that each major axis is in an east-west direction. The 16 absorber tubes are moved in unison in a north-south direction by the solar tracking system. The total collector aperture area is 3,840 square feet. Water is used as the heat collection, transfer, and storage medium. Collected solar energy is stored in a 10,000-gallon hot water tank, located adjacent to the building and shaded by the roof. Domestic hot water is provided by a heat exchanger immersed in this tank. Space heating is provided by circulation of hot water from the storage tank through heat exchangers located in the central air distribution system. No auxiliary energy is provided for either domestic hot water or space heating.

A 25-ton absorption chiller utilizes hot water from solar storage to provide chilled water to a 10,000-gallon cold water storage tank. For space cooling, water from this cold tank is circulated through heat exchangers located in the building's central air distribution system. Auxiliary cooling is provided by supplemental cold water from the utility district's central chiller plant, which is powered by fossil fuels.

The system, shown schematically in Figure 1, has five modes of solar operation.

Mode 1 - Collector-to-Storage: This mode is entered when the collector absorber plate temperature is 10°F higher than the temperature at the bottom of the hot storage tank (water solar thermal storage). Water is circulated through the collector array-storage loop by pump P1 until the temperature of the water at the bottom of storage rises to within 3°F of that of the collector absorber plate.

Mode 2 - Storage-to-Space Heating: This mode is entered when the temperature falls below the setting of the thermostats located in the occupied areas. Since this is the only means of space heating available, no minimum tank temperature is specified. Pump P2 causes hot water to flow directly from the storage tank to the heat exchanger in the air-handling unit, and back to the storage tank.

Mode 3 - Domestic Hot Water Heating: Domestic hot water (DHW) is provided by passing city supply water through a heat exchanger immersed in the solar thermal storage tank. No conventional water heater exists, thus water is heated only upon demand. A tempering valve is used when necessary to reduce the temperature of water leaving the heat exchanger. If the water is too hot, cold supply water is mixed with it in the tempering valve before going to the DHW line.

Mode 4 - Chilled Water Production: This mode is entered when the temperature of the water in the top of the solar thermal storage tank is at or above the generator operating temperature (nominally 180°F) and that of the water at the bottom of the 10,000-gallon chilled water storage is greater than 45°F. Hot water is drawn from the solar thermal storage tank to operate the generator section of the absorption chiller and cold water is circulated through the chiller from the chilled water storage. Energy is removed from the cold water, lowering its temperature; the energy is rejected through the cooling tower, and the cold water returns to the chilled water storage tank. Whenever the temperature

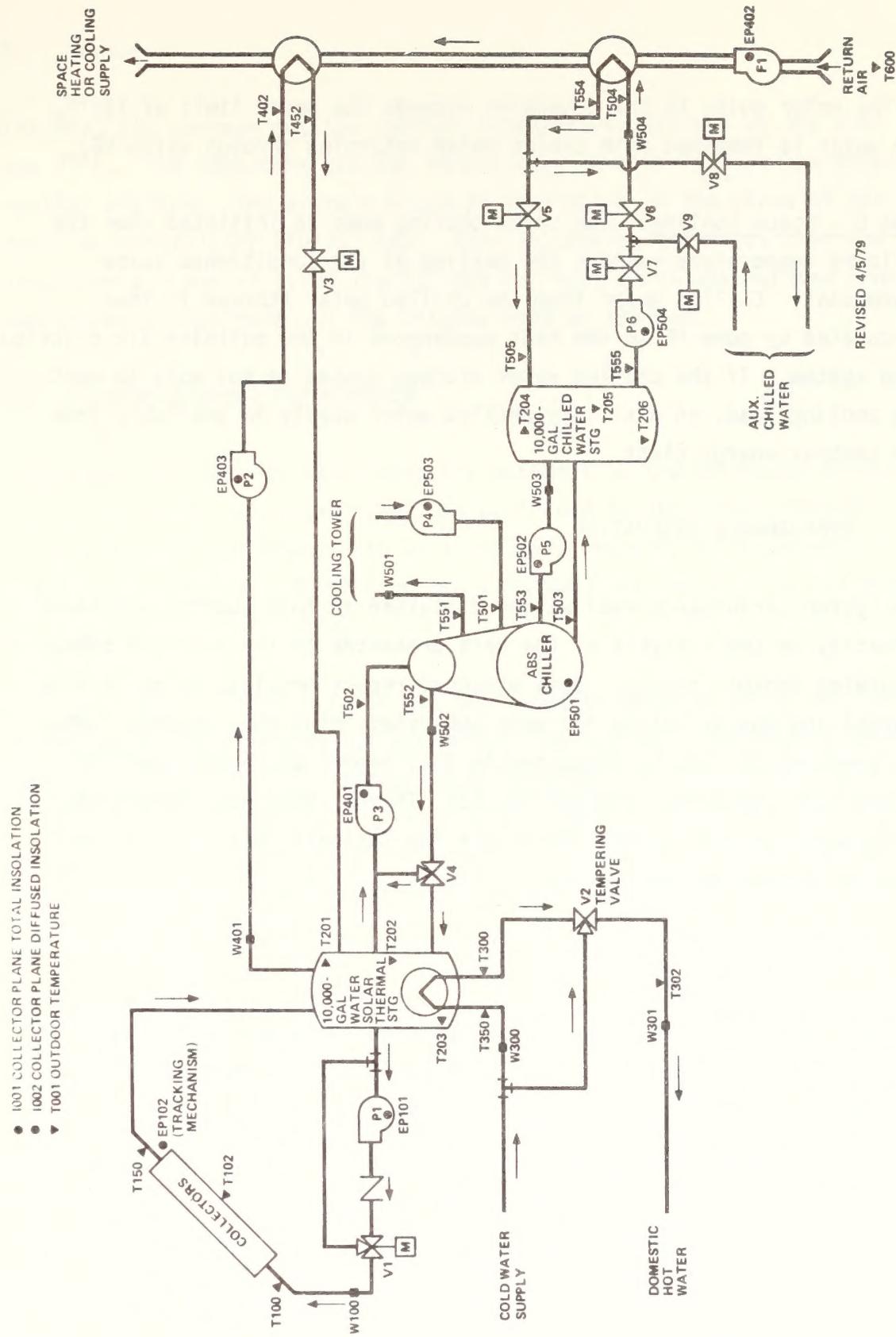


Figure 1. REEDY CREEK SOLAR ENERGY SYSTEM SCHEMATIC

of the water going to the generator exceeds the upper limit of 195°F, the water is tempered with cooler water returning through valve V4.

Mode 5 - Space Cooling: The space cooling mode is initiated when the building temperature exceeds the setting of the conditioned space thermostat. Chilled water from the chilled water storage is then circulated by pump P6 to the heat exchangers in the building air distribution system. If the chilled water storage system is not able to meet the cooling load, an auxiliary chilled water supply is available from the central energy plant.

II. PERFORMANCE EVALUATION

The system performance evaluations discussed in this section are based primarily on the analysis of the data presented in the attached computer-generated monthly report. This attached report consists of daily site thermal and energy values for each subsystem, plus environmental data. The performance factors discussed in this report are based upon the definitions contained in NBSIR 76-1137, Thermal Data Requirements and Performance Evaluation Procedures for the National Solar Heating and Cooling Demonstration Program.

A. Introduction

The Reedy Creek solar energy system operated continuously throughout the month of May. The DHW demand was 0.19 million Btu, there was no space heating demand, and the space cooling demand was 14.02 million Btu. The solar energy system supplied 100 percent of the DHW requirement, and 58 percent of the space cooling requirements - these quantities are reported in the attached computer printout as loads.

B. Weather

For May, the average outside ambient temperature measured at the site was 77°F. The long-term average temperature is also 77°F at the Orlando weather station. The average measured insolation in the plane of the array was only 1,722 Btu/ft²-day. This is considerably less than the long-term average of 1,988 Btu/ft²-day for May, which was derived from measurements also taken at the Orlando weather station.

C. System Thermal Performance

Collector - Of the 204.95 million Btu incident on the collector array, 25.39 million Btu were collected and delivered to the solar thermal storage tank. This represents an array efficiency of 12.4 percent. Operating energy of 1.35 million Btu (396 kwh) was required to collect and store this solar energy.

Storage - Of the 25.39 million Btu delivered to storage, 17.79 million Btu were subsequently removed for use within the system. Temperature probes within the solar thermal storage tank indicate that the internal energy of the water increased by 0.37 million Btu during the month. This indicates a resulting loss to the environment of 7.23 million Btu through the tank insulation. A further discussion of the tank insulation heat transfer is contained in Section II-D, Observations.

Domestic Hot Water - Domestic hot water is provided to the building by passing city water through a heat exchanger that is immersed in the solar thermal storage tank. A total of 376 gallons of water at an average temperature of 128°F were supplied by this system during May. The average temperature increase was 58°F, which resulted in a measured demand of 0.19 million Btu. All of this energy was supplied by the solar energy system. There was no operating energy required.

Space Heating - No space heating was required during the month of May.

Absorption Chiller - The absorption chiller operated on 14 occasions to reduce the chilled water storage temperature during May. A total of 2.35 million Btu of electrical energy from the auxiliary conventional cooling system was required to assist the absorption chiller to meet the cooling load on 20 days of the month. The absorption chiller utilized 17.60 million Btu from the solar thermal storage tank to remove 7.21 million Btu from the chilled water storage (see attached Auxiliary Performance data). The resulting coefficient of performance (COP) of 0.504 is slightly less than that experienced last month, but very near the average of the past 10 months.

Chilled Water Storage - Performance of the chilled water storage (see attached Auxiliary Storage Performance data) shows that 7.21 million Btu were removed by the chiller, 8.15 million Btu were added from the conditioned space during cooling, and the internal energy of the chilled water storage decreased by 0.36 million Btu. This implies that 1.27 million Btu were lost from the water to the ambient environment through the insulation.

Space Cooling - Space cooling was required on all of the working days of the month. The space cooling load was 14.02 million Btu. Water from the chilled water storage was pumped through the air duct heat exchangers to remove 8.15 million Btu from the air. Chilled water from the central plant was required to assist in supporting the cooling load during all but three of the days of the month when space cooling was required. This resulted in a space cooling solar fraction of 58 percent for the month of May.

D. Observations

The absorption chiller COP was slightly down from the exceptionally high value experienced in April. This can be attributable to the more typical insolation experienced in May. The sky was exceptionally clean in April,

resulting in more direct and less diffuse solar energy. The collectors at Reedy Creek primarily collect direct solar radiation and, therefore, were able to supply the absorption chiller with higher temperature water in April. Cloud cover increased in May to a more typical level, and this in turn, slightly reduced the generator inlet temperature of the absorption chiller, which slightly reduced the COP. It should be noted that the average daily temperatures shown in the tables will not necessarily indicate the decreased temperature when averaged over a 24-hour period. This is because the chillers can rapidly lower the storage tank temperature when it is operated.

Losses from the hot water storage tank were less than the previous month but similar to what has been observed over the past eight months. This rate of loss of thermal energy appears to be large when compared to other solar energy systems, but typical for the Reedy Creek Facility.

Instrumentation indicates a loss of 1.27 million Btu to the environment from the chilled water storage tank. This occurred while the average tank temperature was below the ambient temperature. This phenomenon cannot actually occur, but has been indicated on several occasions in the past. It is most likely due to thermal stratification within the tank and to small temperature changes which are less than the accuracy of the instrumentation. Investigations will be made in an attempt to determine the accuracy of several temperature sensors, to improve them if possible.

E. Energy Savings

A total electrical energy savings of 0.37 million Btu (108 kwh) was realized. This value assumes that, had there not been a solar energy system, the energy requirements would have been met by an electrical hot water heater and by a conventional electrical heat pump.

III. ACTION STATUS

The accuracy of the several temperature sensors in the space cooling system are being investigated.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM
 MONTHLY REPORT
 SITE SUMMARY

SITE: REEDY CREEK
 REPORT PERIOD: MAY, 1979

SITE/SYSTEM DESCRIPTION:

THE REEDY CREEK SITE IS A 6100 SQ. FT. CONCRETE BLOCK OFFICE BUILDING. THE LIQUID SYSTEM EMPLOYS 3840 SQ. FT. OF PARABOLIC COLLECTORS, WHICH FORM AN INTEGRAL PART OF THE ROOF. THE SYSTEM IS DESIGNED TO PROVIDE SPACE HEATING, AND DOMESTIC HOT WATER. AN ABSORPTION CYCLE CHILLER PROVIDES COOLING. A RADIANT HOT WATER COIL PROVIDES HEATING AND A COIL SUBMERGED IN THE HOT STORAGE TANK PROVIDES HOT WATER AUXILIARY COOLING. THERE IS NO AUXILIARY DHW OR CHILLED WATER FROM THE CENTRAL COOLING PLANT.

GENERAL SITE DATA: INCIDENT SOLAR ENERGY

COLLECTED SOLAR ENERGY

AVERAGE AMBIENT TEMPERATURE	AVERAGE BUILDING TEMPERATURE	AVERAGE SOLAR CONVERSION EFFICIENCY	ECSS OPERATING ENERGY	TOTAL SYSTEM OPERATING ENERGY	TOTAL ENERGY CONSUMED
66.77 DEGREES F	76 DEGREES F	0.09	1.347 MILLION BTU	4.983 MILLION BTU	32.724 MILLION BTU

SUBSYSTEM SUMMARY:

LOAD	HOT WATER	HEATING
SOLAR FRACTION USED	0.187	0.000
OPERATING ENERGY	1.00	0
AUX. THERMAL ENERGY	N.A.	0.000
AUX. ELECTRIC FUEL	N.A.	N.A.
AUX. FOSSIL FUEL	N.A.	N.A.
ELECTRICAL SAVINGS	0.187	0.000
FOSSIL SAVINGS	N.A.	N.A.

SYSTEM PERFORMANCE FACTOR:

* DENOTES UNAVAILABLE DATA

@ DENOTES NULL DATA

N.A. DENOTES NOT APPLICABLE DATA

PREFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
 OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
 SOLAR/0004-78/18

SOLAR/2018-79/05

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT

SITE: REEDY CREEK
REPORT PERIOD: MAY, 1979

SITE/SYSTEM DESCRIPTION:

THE LIQUID SYSTEM EMPLOYS 6100 SQ. FT. CONCRETE BLOCK OFFICE BUILDING. WHICH FORM AN INTEGRAL PART OF THE ROOF. THE SYSTEM IS DESIGNED TO PROVIDE SPACES HEATING, COOLING, AND DOMESTIC HOT WATER. A ABSORPTION CYCLE CHILLER PROVIDES HEATING AND A COILS SUBMERGED IN THE HOT STORAGETANK PROVIDES HOT WATER. AUXILIARY COOLING IS PROVIDED BY CHILLED WATER FROM THE CENTRAL COOLING PLANT. THERE IS NO AUXILIARY DHW OR HEATING.

GENERAL SITE DATA: ENERGY INCIDENT SOLAR ENERGY

AVERAGE AMBIENT TEMPERATURE	AVG. BUILDING TEMPERATURE	EFF. SOLAR CONVERSION EFFICIENCY	ECSS OPERATING ENERGY	TOTAL SYSTEM OPERATING ENERGY	TOTAL ENERGY CONSUMED
21.6	21.8	0.606085	2.6787	2.75088	1.09
25	24	0.25	0.24	0.24	0.24
DEGREES C	DEGREES C				
1.422	1.422	0.09	0.257	0.257	0.257
GIGA JJOULES	GIGA JJOULES				
34.524	34.524	34.524	34.524	34.524	34.524
GIGA JJOULES	GIGA JJOULES				

SUBSYSTEM SUMMARY:

LOAD	HOT WATER	HEATING	COOLING	SYSTEM TOTAL
SOLAR FRACTION	0.198	0.000	14.795	14.993
SOLAR ENERGY USED	0.100	0	5.58	5.59
OPERATING ENERGY	0.198	0.000	18.570	18.768
AUX. THERMAL ENG.	N.A.	0.000	13.836	15.257
AUX. ELECTRIC FUEL	N.A.	N.A.	6.199	6.199
AUX. FOSSIL FUEL	N.A.	N.A.	2.480	2.480
ELECTRICAL SAVINGS	0.198	0.000	0.390	0.390
FOSSIL SAVINGS	N.A.	N.A.	N.A.	N.A.

SYSTEM PERFORMANCE FACTOR:

0.582

* DENOTES UNAVAILABLE DATA

@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
SOLAR/0004-78/1

SOLAR/2018-79/05

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

REPORT PERIOD: MAY, 1979

SOLAR / 2018-79/05

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	NOT APPLICA BLE		ECSS OPERATING ENERGY MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	NOT APPLICA BLE	ECSS ENERGY REJECTION BTU	ECSS SOLAR CONVERSION EFFICIENCY
				ECSS OPERATING ENERGY MILLION BTU	AUX THERMAL TO ECSS MILLION BTU					
1	5.016	73	0.005	0.027	-	0.001	0.001	0.001	0.001	0.001
2	3.443	73	0.007	0.004	-	0.002	0.002	0.001	0.001	0.002
3	7.384	78	0.028	0.057	-	0.026	0.026	0.007	0.007	0.0163
4	7.633	80	1.728	0.031	-	0.001	0.001	0.001	0.001	0.001
5	5.207	79	0.0832	0.000	-	0.000	0.000	0.000	0.000	0.000
6	5.270	78	0.009	0.000	-	0.000	0.000	0.000	0.000	0.000
7	1.767	73	0.007	0.011	-	0.001	0.001	0.001	0.001	0.001
8	0.1527	75	0.009	0.056	-	0.000	0.000	0.000	0.000	0.000
9	0.447	74	0.007	0.049	-	0.000	0.000	0.000	0.000	0.000
10	0.1528	80	0.007	0.052	-	0.000	0.000	0.000	0.000	0.000
11	7.228	79	0.007	0.058	-	0.000	0.000	0.000	0.000	0.000
12	7.489	80	0.007	0.058	-	0.000	0.000	0.000	0.000	0.000
13	7.798	80	0.007	0.058	-	0.000	0.000	0.000	0.000	0.000
14	4.099	75	0.007	0.058	-	0.000	0.000	0.000	0.000	0.000
15	6.864	76	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
16	8.332	76	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
17	7.590	75	0.007	0.058	-	0.000	0.000	0.000	0.000	0.000
18	8.342	72	0.007	0.058	-	0.000	0.000	0.000	0.000	0.000
19	9.251	74	0.007	0.058	-	0.000	0.000	0.000	0.000	0.000
20	7.336	75	0.007	0.058	-	0.000	0.000	0.000	0.000	0.000
21	6.533	78	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
22	8.214	80	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
23	7.169	73	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
24	2.410	74	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
25	8.662	69	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
26	9.605	74	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
27	8.519	78	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
28	8.926	78	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
29	7.022	79	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
30	7.115	79	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
31	7.943	83	0.008	0.058	-	0.000	0.000	0.000	0.000	0.000
SUM	204.946	-	17.789	N.A.	1.347	N.A.	-	-	-	-
AVG	6.611	77	0.574	N.A.	0.043	N.A.	0.087	0.087	0.087	0.087
NBS ID	Q001	N113			Q102					N111

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
COLLECTOR ARRAY PERFORMANCESITE: REEDY CREEK
REPORT PERIOD: MAY, 1979

SOLAR / 2018-79/05

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP, DEG F	COLLECTOR ARRAY EFFICIENCY
12	5.016	2.850	0.533	77	0.106
13	3.443	0.453	0.002	78	0.001
14	7.384	0.012	0.906	87	0.123
15	7.633	2.594	1.99	88	0.157
16	5.097	3.011	0.394	89	0.000
17	5.270	0.000	0.000	74	0.000
18	4.527	5.630	1.06	76	0.023
19	7.228	0.840	1.129	85	0.156
20	6.747	4.716	1.837	90	0.124
21	7.489	5.026	0.923	90	0.123
22	7.798	6.087	1.129	90	0.145
23	4.099	6.268	1.163	84	0.138
24	4.864	1.736	0.945	85	0.144
25	6.832	6.162	1.945	86	0.107
26	7.590	4.968	1.809	82	0.172
27	8.342	5.884	1.593	84	0.107
28	9.251	7.085	1.593	82	0.172
29	7.336	4.968	1.809	86	0.099
30	6.533	4.450	0.644	88	0.141
31	8.214	6.114	1.156	90	0.122
	7.169	4.522	0.801	82	0.000
	2.410	0.000	0.000	74	0.124
	2.662	0.978	0.72	82	0.162
	9.605	7.139	1.554	85	0.133
	8.519	5.813	1.040	84	0.123
	8.926	6.167	1.863	88	0.174
	7.022	4.982	0.240	90	0.133
	7.115	5.522	1.055	92	0.133
	7.943	5.219			
SUM	204.946	135.324	25.391	-	-
Avg	6.611	4.365	0.819	85	0.124
NRSID	Q001		Q100		N100

* DENOTES UNAVAILABLE DATA.
 @ DENOTES NULL DATA.
 N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT

SITE: REEDY CREEK
REPORT PERIOD: MAY, 1979

SEALAR / 2018-79/05

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP. DEG F	STORAGE EFFICIENCY
1	0.533	0.005	0.398	160	0.757
2	0.002	0.007	-0.262	161	-143.137
3	0.906	0.006	0.743	165	0.827
4	1.199	1.728	-0.701	165	0.857
5	0.987	0.001	0.753	165	0.764
6	0.394	0.832	-0.638	167	0.492
7	0.000	0.009	-0.283	160	1.000
8	0.000	0.007	-0.241	154	-1.031
9	0.000	0.007	-0.126	160	0.872
10	0.000	0.009	-0.975	164	0.847
11	0.000	0.159	-0.450	165	0.703
12	0.000	1.000	-0.649	166	0.867
13	0.000	1.023	-0.544	161	-0.722
14	0.000	0.008	-0.126	165	0.776
15	0.000	0.011	-0.722	165	0.746
16	0.000	0.585	-0.691	164	0.605
17	0.000	1.008	-0.482	164	0.785
18	0.000	1.376	-0.503	161	0.700
19	0.000	1.274	-0.531	164	0.675
20	0.000	1.000	-0.565	165	0.700
21	0.000	0.969	-0.534	163	0.862
22	0.000	0.913	-0.084	165	0.611
23	0.000	0.007	-0.481	166	1.000
24	0.000	0.008	-0.314	166	0.869
25	0.000	0.256	-0.325	164	0.803
26	0.072	1.554	-1.259	162	0.757
27	1.040	1.040	0.002	165	0.775
28	1.184	1.184	0.000	176	0.742
29	0.863	2.290	-1.640	169	0.773
30	1.240	0.822	0.136	163	0.749
31	1.055	0.748	0.042	163	0.749
SUM	25.391	17.789	0.367	-	-
Avg	0.819	0.574	0.012	164	0.715
NBS ID	Q200	Q201	Q202	N108	

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
HOT WATER SUBSYSTEM

REPORT PERIOD: MAY, 1979

SOLAR/2018-79/05

DAY OF MAY	HOT WATER LOAD MILLION BTU	SOLAR FR. OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	SUP. WAT. TEMP DEG F	HOT WAT. TEMP DEG F	HOT WATER USED GAL
1	0.205	100	0.005	100	0.007	0.001	0.001	123	113	13
2	0.207	100	0.006	100	0.014	0.001	0.001	135	115	25
3	0.206	100	0.001	100	0.009	0.001	0.001	122	119	20
4	0.214	100	0.009	100	0.007	0.001	0.001	126	115	15
5	0.201	100	0.007	100	0.009	0.001	0.001	121	110	200
6	0.207	100	0.009	100	0.007	0.001	0.001	115	115	11
7	0.209	100	0.007	100	0.009	0.001	0.001	125	111	0
8	0.207	100	0.009	100	0.007	0.001	0.001	119	119	0
9	0.209	100	0.007	100	0.009	0.001	0.001	113	113	0
10	0.207	100	0.009	100	0.007	0.001	0.001	123	119	0
11	0.212	100	0.007	100	0.009	0.001	0.001	126	119	0
12	0.214	100	0.008	100	0.007	0.001	0.001	119	119	0
13	0.215	100	0.009	100	0.007	0.001	0.001	125	119	0
14	0.216	100	0.009	100	0.007	0.001	0.001	115	119	0
15	0.217	100	0.009	100	0.007	0.001	0.001	121	119	0
16	0.218	100	0.005	100	0.008	0.001	0.001	126	119	0
17	0.219	100	0.008	100	0.007	0.001	0.001	119	119	0
18	0.220	100	0.010	100	0.007	0.001	0.001	125	119	0
19	0.221	100	0.012	100	0.007	0.001	0.001	115	119	0
20	0.222	100	0.012	100	0.007	0.001	0.001	123	119	0
21	0.223	100	0.008	100	0.007	0.001	0.001	126	119	0
22	0.224	100	0.007	100	0.007	0.001	0.001	119	119	0
23	0.225	100	0.002	100	0.007	0.001	0.001	127	119	0
24	0.226	100	0.002	100	0.007	0.001	0.001	127	119	0
25	0.227	100	0.002	100	0.007	0.001	0.001	127	119	0
26	0.228	100	0.007	100	0.007	0.001	0.001	127	119	0
27	0.229	100	0.007	100	0.007	0.001	0.001	127	119	0
28	0.230	100	0.010	100	0.007	0.001	0.001	131	119	0
29	0.231	100	0.012	100	0.010	0.001	0.001	131	119	0
30	0.232	100	0.012	100	0.010	0.001	0.001	136	119	0
31	0.233	100	0.012	100	0.010	0.001	0.001	136	119	0
SUM	0.187	-	-	0.187	N.A.	N.A.	N.A.	0.187	N.A.	-
AVG	0.006	100	0.006	0.006	N.A.	N.A.	N.A.	0.006	N.A.	-
NBS	Q302	N300	2300	Q303	Q301	Q305	Q306	Q311	Q313	N305

* DENOTES UNAVAILABLE DATA.
a DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SPACE HEATING SUBSYSTEMSITE: REEDY CREEK
REPORT PERIOD: MAY, 1979

SOLAR/2018-79/05

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR. OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG TEMP DEG. F	AMB TEMP DEG. F
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	73
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	74	73
3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	78	80
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	79	79
5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	78	78
6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	73	73
7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	74	74
8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	74	74
11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	74	74
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
26	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
27	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
29	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
31	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75	75
SUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	N.A.	N.A.
Avg	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	N.A.	N.A.
NBS	Q402	N400	Q400	Q403	Q401	Q410	Q415	Q417	Q406	N406	N113

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SPACE CONDITIONING SUBSYSTEM

REPORT PERIOD: MAY, 1979

SOLAR/2018-79/05

DAY OF MON.	SPACE COOLING LOAD MILLION BTU	SOLAR ENERGY FR. OF LOAN PCT	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU		AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG DRY TEMP DEG F	AM TEMP DEG F
					NOT APPLICA BLE	NOT APPLICA BLE					
1	0.392	77	0.000	0.100	0.025	0.015	0.000	0.101	75	73	
2	0.228	89	0.000	0.103	0.042	0.017	0.000	0.056	74	73	
3	0.393	46	0.000	0.060	0.274	0.097	0.000	0.420	76	80	
4	0.416	34	0.000	0.042	0.242	0.097	0.000	0.300	78	79	
5	0.242	0	0.000	0.030	0.000	0.024	0.000	0.470	75	74	
6	0.715	40	0.000	0.143	0.431	0.172	0.000	0.100	79	80	
7	0.545	28	0.000	0.108	0.227	0.153	0.000	0.147	75	75	
8	0.000	30	0.000	0.000	0.000	0.000	0.000	0.000	75	76	
9	0.804	98	0.000	0.000	0.000	0.000	0.000	0.000	75	75	
10	0.317	40	0.000	0.152	0.000	0.000	0.000	0.147	74	72	
11	0.540	30	0.000	0.150	0.000	0.000	0.000	0.173	75	75	
12	0.713	100	0.000	0.023	0.000	0.000	0.000	0.236	75	75	
13	0.144	97	0.000	0.000	0.000	0.000	0.000	0.173	75	75	
14	0.352	95	0.000	0.000	0.000	0.000	0.000	0.153	75	75	
15	0.700	52	0.000	0.236	0.000	0.000	0.000	0.173	75	75	
16	0.930	72	0.000	0.236	0.000	0.000	0.000	0.173	75	75	
17	0.700	70	0.000	0.234	0.000	0.000	0.000	0.173	75	75	
18	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000	75	75	
19	0.589	100	0.000	0.000	0.000	0.000	0.000	0.000	75	75	
20	1.071	31	0.000	0.901	0.000	0.000	0.000	0.000	75	75	
21	1.185	32	0.000	0.000	0.000	0.000	0.000	0.000	75	75	
22	0.780	26	0.000	0.000	0.000	0.000	0.000	0.000	75	75	
23	0.827	32	0.000	0.000	0.000	0.000	0.000	0.000	75	75	
24	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000	75	75	
25	0.837	100	0.000	0.000	0.000	0.000	0.000	0.000	75	75	
26	0.774	60	0.000	0.259	0.000	0.000	0.000	0.215	75	75	
27	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000	75	75	
28	0.902	100	0.000	0.259	0.000	0.000	0.000	0.215	75	75	
29	0.837	60	0.000	0.284	0.000	0.000	0.000	0.215	75	75	
30	0.774	60	0.000	0.284	0.000	0.000	0.000	0.215	75	75	
31	0.000	0	0.000	0.284	0.000	0.000	0.000	0.215	75	75	
SUM	14.024	-	17.602	3.636	5.876	2.350	N.A.	1.530	N.A.	-	
AVG	0.452	58	0.568	0.117	0.189	0.076	N.A.	0.049	N.A.	76	
NBS	Q502	N500	Q500	Q503	Q501	Q508	Q512	Q514	Q512	N406	
										N113	

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENVIRONMENTAL SUMMARY

REPORT PERIOD: MAY, 1979

SOLAR/2018-79/05

DAY OF MONTH	TOTAL INSOLATION BTU/SQ. FT	DIFFUSE INSOLATION BTU/SQ. FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	1306	529	73	77	78	87	N
2	1897	615	73	78	88	88	NOT
3	1923	614	80	79	89	74	A
4	1988	482	71	78	80	80	P
5	1877	612	262	73	74	75	P
6	1327	671	32	75	75	85	U
7	1331	553	553	80	80	90	C
8	146	484	510	80	80	90	A
9	1179	553	501	75	77	88	P
10	1168	484	659	77	77	90	U
11	1175	563	563	77	77	84	C
12	1950	527	527	76	76	85	A
13	2031	501	670	75	75	86	P
14	1068	659	448	72	72	82	U
15	1178	563	208	74	74	84	C
16	1217	527	2516	75	75	86	B
17	1977	670	644	78	78	88	E
18	2172	448	540	81	81	90	U
19	2409	208	617	80	80	88	C
20	1910	2516	644	75	75	84	B
21	1701	540	540	78	78	82	E
22	2139	617	617	80	80	88	U
23	1867	617	364	73	73	74	C
24	1628	364	472	74	74	82	B
25	2256	2256	167	69	69	76	E
26	2501	2219	504	74	74	85	U
27	2219	2325	405	78	78	88	C
28	2325	1829	626	79	79	90	B
29	1853	1853	310	79	79	93	E
30	2068	402	402	83	83	92	U
SUM	53371	15060	—	—	—	—	—
AVG	1722	486	—	77	85	—	N.A.
NBS ID	Q001	—	N113	—	N115	—	N114

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
THERMODYNAMIC CONVERSION EQUIPMENTSITE: REEDY CREEK
REPORT PERIOD: MAY, 1979

SOLAR/2018-79/05

DAY OF MONTH	EQUIPMENT LOAD MILLION BTU	THERMAL ENERGY INPUT MILLION BTU	OPERATING ENERGY MILLION BTU	ENERGY REJECTED MILLION BTU	COEFFICIENT OF PERFORMANCE (SEE N.C.T.E.)
1	0.000	0.000	0.000	-0.014	0.000
2	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.008	0.366	0.156
4	0.087	1.715	0.000	0.004	0.000
5	0.000	0.000	0.030	0.924	0.323
6	0.268	0.832	0.000	0.000	0.000
7	0.002	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000
9	0.006	0.000	0.000	0.000	0.000
10	0.064	0.152	0.000	0.460	0.243
11	0.006	0.000	0.014	0.000	0.000
12	0.107	0.523	0.000	0.873	0.374
13	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000
15	0.914	0.580	0.155	0.692	0.578
16	0.000	0.000	0.000	0.000	0.000
17	0.000	0.366	0.000	0.000	0.000
18	0.827	1.10	0.234	0.000	0.363
19	0.618	0.901	0.094	0.000	0.200
20	0.000	0.000	0.000	0.000	0.000
21	0.514	0.059	0.102	0.569	0.536
22	0.509	0.000	0.000	1.490	0.565
23	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000
25	0.695	1.249	0.104	2.104	0.556
26	0.630	1.25 ^a	0.137	1.971	0.501
27	0.000	0.000	0.000	0.000	0.000
28	0.000	0.000	0.284	0.490	0.485
29	1.107	2.284	0.109	1.347	0.549
30	0.445	0.811	0.105	1.217	0.560
31	0.413	0.736	0.000	0.000	0.000
SUM	7.214	17.602	1.370	26.871	0.504
Avg	0.233	0.568	0.044	0.867	0.016

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.
NOTE:

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
AUXILIARY STORAGE PERFORMANCESITE: REEDY CREEK
REPORT PERIOD: MAY, 1979

SOLAR/2018-79/05

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	INCREASED IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	0.302	0.000	0.269	62	1.000
2	0.202	0.000	0.198	65	1.000
3	0.181	0.000	0.153	67	1.000
4	0.142	0.087	-0.0840	64	1.269
5	0.000	0.000	-0.037	58	2.297
6	0.000	0.002	-0.016	56	-104.561
7	0.000	0.000	-0.016	52	-1.000
8	0.788	0.000	0.486	57	1.000
9	0.285	0.000	0.1727	61	-37.666
10	0.090	0.006	-0.007	65	1.000
11	0.000	0.000	-0.007	64	1.000
12	0.000	0.000	-0.007	60	1.000
13	0.000	0.000	-0.007	55	1.000
14	0.713	0.000	0.713	61	1.000
15	0.126	0.000	0.126	59	0.795
16	0.333	0.000	0.333	60	1.000
17	0.486	0.000	0.486	59	0.998
18	0.500	0.000	0.500	61	1.021
19	0.000	0.000	-0.007	56	1.000
20	0.000	0.000	-0.007	51	0.998
21	0.689	0.000	0.689	55	1.000
22	0.326	0.000	0.326	58	1.000
23	0.000	0.000	-0.007	57	1.000
24	0.200	0.000	0.200	60	1.000
25	0.266	0.000	0.266	60	0.985
26	0.000	0.000	-0.007	54	1.049
27	0.000	0.000	-0.007	49	1.000
28	0.000	0.000	-0.007	50	0.544
29	0.909	0.000	0.909	57	0.742
30	0.618	0.000	0.618	57	1.283
31	0.462	0.000	0.462	-0.067	-
SUM	8.148		7.214	-0.359	-
AVG	0.263		0.233	-0.012	58
					1.179

* DENOTES UNAVAILABLE DATA.
 @ DENOTES NULL DATA.
 N.A. DENOTES NOT APPLICABLE DATA.

UNIVERSITY OF FLORIDA



3 1262 09052 5782